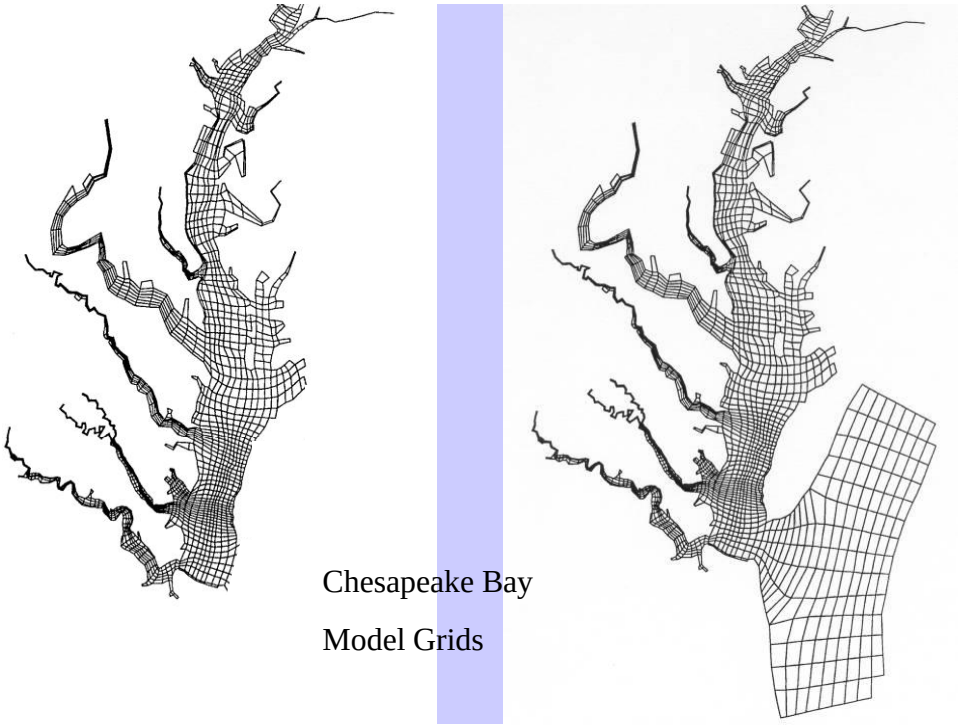
ST. LUCIE ESTUARY PEER REVIEW PANEL CLARIFICATIONS

Open Boundary Salinity Conditions for Hydrodynamic Model Predictions

Page D-17 states that for boundary conditions, salinity is prescribed at ocean boundaries as a constant and equals 35 ppt when the tide is entering the model domain while an advection scheme is used to calculate salinity when the tide is leaving the model domain. Assigning the open boundary salinity conditions in this fashion raises a concern in model prediction: what if the salinity levels at the open boundary are affected by the system response to freshwater pulses. That is, salinity levels at the open boundary might be influenced by the estuarine salt content following certain flow change scenarios. In that case, the salinity levels assigned are not qualified as open boundary conditions. The following grid change for the 3-D Chesapeake Bay Hydrodynamic and Water Quality Model was needed simply to treat this problem and resolve this issue.



Chesapeake Bay

Model Grids

On the left is the original model grid of the Chesapeake Bay. The revised grid on the right eliminates the open boundary problem. That is, a constant salinity of 35 ppt is set at the open boundary of the new grid (with an expanded model domain) all the time.

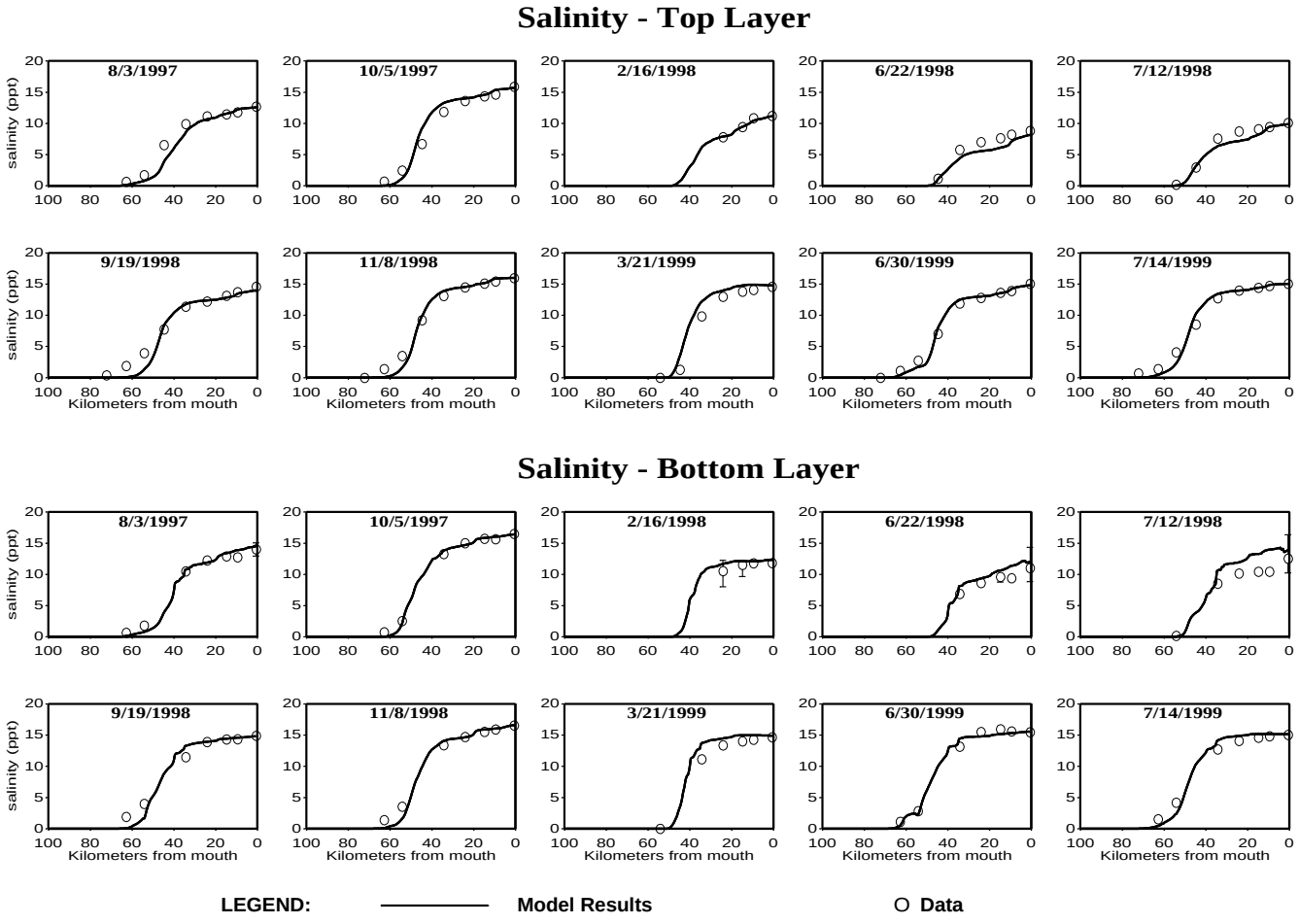
Calculated vs. Measured Salinity at Prim Vista Bridge and Midway

Note that the R^2 values for these two locations (see Table 8 in p.D-17) are low and much lower than those for the other stations in the table. It should be pointed out that salinity predictions at these two upstream locations are critical as the 1ppt isohaline could easily take place between these two locations depending on the freshwater flow rates.

Also note that the comparison of model results and measured salinity at Station HR1 is not quite satisfactory. Any explanation?

Spatial Salinity Profiles

Temporal plots in App. D can be supplemented with spatial salinity snapshots showing model results vs. field data to better demonstrate the interplay of spatial and temporal variations of salinity. The following figure shows snapshots of salinity profiles in the Patuxent Estuary, MD (Lung and Nice, 2007).



From Lung and Nice, 2007. Journal *of Environmental Engineering*.

Vertical stratification is mentioned in p.D-4. Stratification of salinity or dissolved oxygen at where? Surface and bottom salinity are measured at Kelstadt in 1999 and 2003 but they are shown in Figures 10 and 11 for comparison with model results.

Temporal plots of Freshwater Input to the St. Lucie Estuary

It is suggested that total freshwater input (in cfs) be added in Figures 10-15 to reflect the seasonal flow changes on the salinity levels in the estuary.

Vertical Averaging of Salinity Results

At Prim Vista, Midway, SE01 to SE04, HR1, SE06 to SE11, salinity is measured only at mid water column. How did you come up with model results (from 4 vertical layers) for comparison with data (Figures 12-15)?

Water Quality of the St. Lucie Estuary

The water quality description of Sec. 4.8 starting p.4-17 is very brief. While the report mentions hypoxic and anoxic events in bottom waters (p. D-1) of the St. Lucie Estuary, no dissolved oxygen data [and location(s)] are presented in the report. Inflows to the Indian River Lagoon and the St. Lucie Estuary contain excessive nutrients, as well as …… (p.4-18). What are the nutrient levels in these two systems? A documentation of existing water quality conditions in these receiving waters is important in light of the potential impact of flow changes on salinity and any other water quality constituents.

Lake Okeechobee Water Release

Any salinity (and possibly water quality) impacts of Lake Okeechobee release (via C-44) were addressed in this study or it is out of scope, considering the sophisticated release schedule proposed by Army Corps of Engineers?

Minor Comments

1. The text and Figure 4 (p.D-7) in terms of the structures are not matching. Does S-48 flow include that from S-97? Table 3 in the text should be called Table 2 instead.

2. Another column listing the total flows can be added in Table 2 (p.D-8). While the text (p.D-7) states the percent of the total flow from individual basins, a column showing these percentages in Table 2 would help.

3. Table 4 in the text (p.D-9) should be Table 3 instead.